REMARKS

This is intended as a full and complete response to the Office Action dated June 15, 2004, having a shortened statutory period for response set to expire on September 15, 2004. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-5, 7-11, 18, and 32 remain pending in the application and are shown above. Claims 1-5, 7-11, and 32 stand rejected. Claim 18 is indicated to be allowable by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Applicants have added new claims 33-42 to claim additional aspects of the invention. Applicants submit that the changes made herein do not introduce new matter.

Claims 1-5, 7-9, and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Subrahmanyan, et al.* (U.S. Patent No. 6,107,192) in view of *Parkhe*, (U.S. Patent No. 6,033,482) and *Chen, et al.* (U.S. Patent No. 6,132,813). The Examiner states that *Subrahmanyan, et al.* fails to disclose cooling the substrate to a temperature of 100°C or less. The Examiner states that *Parkhe* teaches cooling a substrate before activating the plasma in a pre-cleaning process (column 3, lines 40-67) and asserts that it would have been obvious to modify *Subrahmanyan, et al.* in view of *Parkhe* by cooling the substrate because it will stabilize the substrate temperature and result in effective cleaning. The Examiner further asserts that it would have been obvious to use the temperature range of 5-80°C provided for *Chen, et al.'s* cleaning process as *Parkhe* discloses that temperature is a result effective variable that can be controlled via a heat transfer medium (column 3, lines 40-50, column 4, lines 4-15). Applicants respectfully traverse the rejection.

Subrahmanyan, et al. describes cleaning features of a substrate with a plasma but does not disclose the temperature of the substrate during the plasma cleaning step or suggest that the temperature of the substrate prior to or during plasma cleaning is important. *Parkhe* describes a method of preventing charging of a substrate during plasma ignition by deactivating chuck electrodes before ignition of the plasma, such as

for plasma cleaning. Applicants respectfully submit that column 3, lines 40-67 of *Parkhe* does not describe cooling the substrate before activating the plasma in a pre-cleaning process, as asserted by the Examiner. Column 3, lines 40-67 of *Parkhe* teaches that for effective substrate cleaning, a substrate must be temperature controlled prior to a plasma being ignited in the chamber. While *Parkhe* indicates that the substrate temperature should be stabilized prior to cleaning (column 3, lines 51-52), *Parkhe* does not teach or suggest that cooling a substrate prior to cleaning results in effective cleaning. *Parkhe* states that a substrate may undergo pre-plasma processing such as heating or cooling (column 5, lines 11-12), but does not teach or suggest that a particular temperature treatment of the substrate has an effect on cleaning results. Thus, Applicants submit that the combination of *Subrahmanyan, et al.* and *Parkhe* does not suggest or motivate modifying *Subrahmanyan, et al.* in view of *Parkhe* by cooling the substrate.

Chen, et al. describes optionally plasma pre-cleaning the surface of a slider of a magnetic disk drive before forming an anti-wetting layer on the slider. *Chen, et al.* provides a temperature range of 5-80°C for the pre-cleaning. Applicants submit that there is no suggestion or motivation in *Subrahmanyan, et al.*, *Parkhe*, or *Chen, et al.*, individually or in combination to use the temperature range that *Chen, et al.* provides for pre-cleaning a slider of a magnetic disk drive in *Subrahmanyan, et al.'s* method of pre-cleaning submicron features of a substrate, as modified by *Parkhe*. As discussed above, Applicants submit that the combination of *Subrahmanyan, et al.* and *Parkhe* does not teach or suggest that temperature is a result effective variable to be optimized for a pre-cleaning process. Applicants further submit that the combination of *Chen, et al.'s* temperature range of 5-80°C for pre-cleaning a slider of a magnetic disk drive with *Subrahmanyan, et al.* and *Parkhe's* substrate pre-cleaning processes does not suggest a method for pre-cleaning apertures on a substrate, wherein the method comprises cooling the substrate to a temperature of 100°C or less.

Therefore, Applicants respectfully submit that *Subrahmanyan, et al.* in view of *Parkhe* and *Chen, et al.* does not teach, show, or suggest a method for pre-cleaning apertures on a substrate, the method comprising disposing the substrate on a substrate support member in a process chamber, cooling the substrate to a temperature of 100

degrees Celsius or less, and exposing the substrate to a pre-clean process comprising forming a plasma from a gas mixture consisting of a non-reactive gas and a reactive gas selected from the group consisting of fluorine containing gases and hydrogen, as recited in claim 1. Applicants respectfully request withdrawal of the rejection of claim 1 and of claims 2-5, 7-9, and 32, which depend thereon.

Claims 10-11 stand rejected under U.S.C. § 103(a) as being unpatentable over *Denning, et al.* (U.S. Patent No. 6,451,181) in view of *Parkhe* and *Asaka* (U.S. Patent No. 5,236,537). The Examiner states that *Denning, et al.* fails to disclose cooling the substrate to a temperature of 100°C or less. The Examiner states that *Parkhe* teaches cooling a substrate before activating the plasma in a pre-cleaning process (column 3, lines 40-67) and asserts that it would have been obvious to modify *Denning, et al.* in view of *Parkhe* by cooling the substrate because it will stabilize the substrate temperature and result in effective cleaning. The Examiner further asserts that *Parkhe* discloses that temperature is a result effective variable that can be controlled via a heat transfer medium (column 3, lines 40-50, column 4, lines 4-15) and notes that *Asaka* discloses that a temperature of 25°C is effective to remove contamination. The Examiner concludes that it would have been obvious to perform routine experimentation to obtain an optimal temperature as an expected result. Applicants respectfully traverse the rejection.

Denning, et al. describes pre-cleaning a feature of a substrate with a plasma but does not disclose the temperature of the substrate during the plasma cleaning step or suggest that the temperature of the substrate prior to or during plasma cleaning is important. As discussed above with respect to claim 1, while *Parkhe* describes controlling or stabilizing a substrate temperature before cleaning, *Parkhe* does not teach that the temperature is a result effective variable. Applicants respectfully submit that a processing parameter must be recognized as a result-effective variable, *i.e.*, a variable which achieves a recognized result, before the determination of the optimum or workable ranges can be characterized as routine experimentation (MPEP 2144.05, section II B).

Asaka describes a plasma etching apparatus in which a substrate may be pre-cleaned prior to etching and provides examples of pre-cleaning processes performed at

a substrate temperature of 25°C in the plasma etching apparatus. However, *Asaka* does not teach or suggest that the substrate temperature is a result-effective variable. Thus, Applicants submit that the combination of *Asaka* with *Denning, et al.* and *Parkhe* does not teach or suggest a method of pre-cleaning apertures on a substrate, wherein the method comprises cooling the substrate to a temperature of 100°C or less.

Thus, *Denning, et al.* in view of *Parkhe* and *Asaka* does not teach, show, or suggest a method for pre-cleaning apertures on a substrate, the method comprising disposing the substrate on a substrate support member in a process chamber, electrostatically chucking the substrate to the substrate support member, cooling the substrate to less than about 100 degrees Celsius, and exposing the substrate a pre-clean process comprising a plasma formed from a gas mixture consisting of a non-reactive gas, as recited in claim 10. Applicants respectfully request withdrawal of the rejection of claim 10 and of claim 11, which depends thereon.

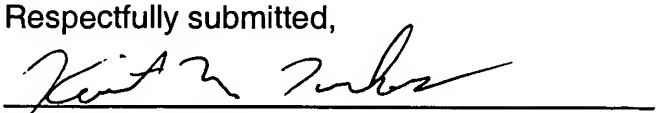
Applicants submit that new claims 33-37 are patentable for the reasons discussed above with respect to claim 10, as new claims 33-37 depend from claim 10. Applicants respectfully request allowance of new claims 33-37.

Applicants submit that new claims 38-42 are allowable as they depend from allowable claim 18. Applicants respectfully request allowance of new claims 38-42.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



Keith M. Tackett
Registration No. 32,008
MOSER, PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd. Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant(s)